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Some Technical Aspects of Launching Lubricants

By CHARLES W. BOHMER, JR., *Standard Oil Company of New Jersey*

Attention has been focused on launching lubricants the last several years due to the great number of ships launched, most of which depend on thin films of launching greases for their initial and, except for invasion craft, it is to be hoped only amphibious operation. That as much as 50 tons of launching lubricants may be used for the launching of a single large ship has increased interest in this subject.

Very little laboratory technical data on launching greases have been available, mainly because of the difficulty in obtaining and correlating such data with actual launching data. In view of the value of such information for pre-launching calculations, investigations have been undertaken, some of which are reported here. Much of the data are of a preliminary and exploratory nature, but since there is such a dearth of published information on the subject it was considered advisable to report the progress made thus far.

Since preparation of the ways and method of application of launching lubricants may have considerable effect on the result obtained with them, the first part of the paper is concerned with this.

Fig. 1. Foundation for groundways. Note construction crib in background with steel framework of sand blocks installed.

Contrary to popular conception, a ship is not built on the ways. In fact the ways may not be installed until a few weeks before the launching, or if permanent groundways are used, they may not be greased until as late as a week or two before the launching. Figure 1 is a view underneath a partially constructed ship, showing the foundations for the groundways in the foreground. Note construction crib in background with steel framework of sand blocks installed and construction shores in foreground. A similar view is given in Figure 2. Here the foundations for groundways are shown in the foreground, and a completed set of ways is in the background. Figure 3 shows further progress in building the groundways. Here proper transverse inclination is being built into the foundations.

Fig. 2. Construction cribs and groundways foundations, groundways, grease irons, thumb toggles (19), sliding ways, (dirt strips not yet installed), spreader shore in middle foreground and in background.

When the groundways have been completed, any old grease left on them from previous launchings must be removed. In Figure 4 a man is seen scraping old base coat from that portion of the ways that extends to the water's edge. In Figure 5

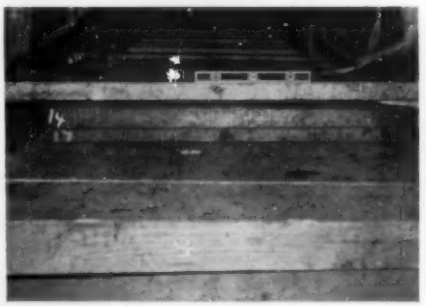

Fig. 3. Introducing transverse camber in foundations for groundways.

Fig. 4. Scraping base coat from outboard groundways.

Fig. 5. Final scraping and cleaning of groundways prior to applying base coat. Note man in foreground using torch to dry groundways.

men are seen scraping the ways further and another following them with a torch used to dry and warm the ways before application of base coat. Drying and warming the ways is considered good practice to obtain proper adherence of the base coat to the wood. Another type of torch for heating the ways is shown in Figure 6 and its use is illustrated in Figure 7. In some yards the ways are scraped again and then reheated before the base coat is applied.

Fig. 6. One type of torch for heating the ways.

Fig. 7. Type of torch in Fig. 6 in operation.

Specialized Launching Lubricants

Although tallow, stearine, "soft soap," and "boiled oil" which used to be used for launching lubricants are used in a small number of yards today, most ships are launched on highly specialized base coat and slip coat of petroleum origin. Base coats are hard, wax-like materials whose purpose is to prevent the sliding ways from getting in contact with the groundways. They must be melted and applied in liquid form to the ways, usually to a thickness of ¼" to ½". Base coats are available in smaller packages for convenience in handling, but the historic method of packaging which is still used in many shipyards is in wooden barrels. The staves and heads are removed from the barrels and the base coat cut into smaller pieces (Figure 8). Chunks of base coat are dropped into a kettle as shown in Figure 9 and heated to the proper temperature (usually 200-250° F., depending upon atmospheric temperatures) as illustrated in Figure 10.

Another type kettle is shown in Figure 11. This will hold about thirteen barrels of base coat, sufficient for the ways of the ships built at the yard where it is used. This and the previous kettle are "home-made," whereas Figure 12 shows a self-contained kettle commercially available on the market.

The base coat is now at the proper temperature and, in this case (Figure 13), is strained through a screen into the buckets in which it is taken to the ways.

Figure 14 shows groundways prepared for application of base coat. Note temporary railroad rails on right-hand side of ways (side near man), and permanent ribband on opposite side. The ribband serves as a restraining guide to the sliding ways when

Fig. 8. Breaking open and splitting up of barrel of new base coat preparatory to melting.

Fig. 9. Chunk of new base coat being dropped into melting pot.

Fig. 10. Molten base coat in melting pot.

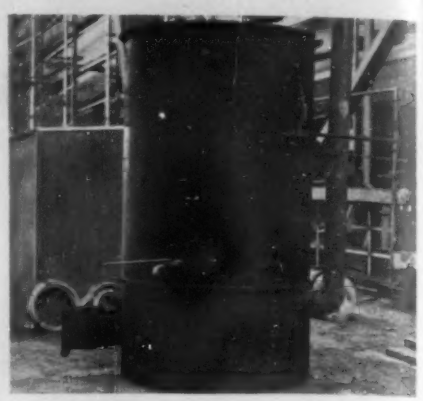

Fig. 11. One type kettle holding about 13 barrels of base coat.

Fig. 12. A commercially available kettle.

Fig. 13. Drawing off melted base coat and straining into bucket.

Fig. 14. Groundways prepared for application of base coat. Note temporary railroad rails still installed on right hand side of ways (side near man), and permanent ribband on opposite side.

TENTATIVE PROGRAM

12th Annual Meeting

NATIONAL LUBRICATING GREASE INSTITUTE

Edgewater Beach Hotel
CHICAGO, ILL.

October 23 - 24 - 25

October 23rd

MORNING:

Registration — *East Lounge*

ADDRESS OF WELCOME
by WILLIAM H. OLDACRE
President, National Lubricating Grease Institute

"Some Methods Used in the Practical Evaluation of Lubricating Greases"
by L. W. SPROULE
Imperial Oil Company

"Centralized Lubrication for Blast Furnaces"
by A. J. JENNINGS
The Farval Corporation

AFTERNOON:

"Report on the Activities of the Coordinating Research Council—War Advisory Committee Grease Advisory Group"
by WALTER G. AINSLEY
Sinclair Refining Company

"Greases for the Bureau of Ships"
by LIEUTENANT F. A. CHRISTIANSON
U. S. Navy Bureau of Ships

"A Machine for Performance Tests of Anti-Friction Bearing Greases"
by P.G. EXLINE and S. A. FLESHER
Gulf Research & Development Company

October 24th

MORNING:

"Torque Characteristics of Lubricating Grease"
by E. W. ADAMS
Research Department
Standard Oil Co. of Indiana

"Separability Characteristics of Greases"
by T. G. ROEHNER and R. C. ROBINSON
General Laboratories
Socony-Vacuum Oil Company, Inc.

"Notes on the Operation and Application of the S.O.D. Pressure-Viscometer"
by J. B. PATBERG and J. C. ZIMMER
Standard Oil Development Company

AFTERNOON:

"Grease Lubrication of Aluminum Rolling Mills"
by DR. E. M. KIPP *of*
ALUMINUM COMPANY OF AMERICA

"The Effect of Mineral Oil Pour Point on the Flow Characteristics of Lubricating Greases"
by C. W. GEORGI and JOHN F. O'CONNELL
Enterprise Oil Company
Quaker State Oil Ref. Corp.

"Naval Gun Factory Performance Grease Tests"
by J. R. REYNOLDS
U. S. Naval Gun Factory

Cocktail Hour — *West Lounge*
Members and Guests are cordially invited
as guests of N.L.G.I.

October 25th

MORNING:

Open Meeting, Technical Committee

AFTERNOON:

Technical Committee Meeting Continued

3. P. M.
Annual Meeting
(Members Only)
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Fig. 15. Initial application of base coat to groundways. Note use of torch to insure that groundways are dry.

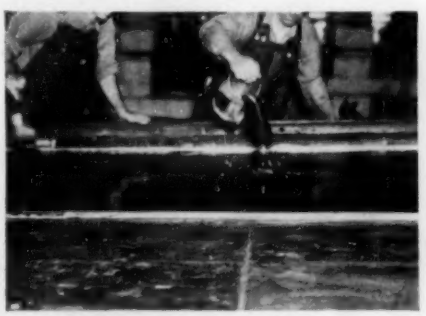

Fig. 16. Pouring hot melted base coat. Note temporary battens.

Fig. 17. Leveling hot melted base coat. Note opening on right side above bolt through which grease iron will be inserted.

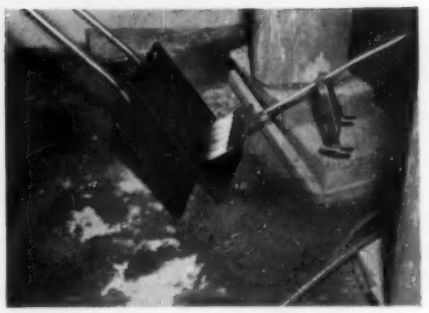

Fig. 18. Heating plates used for ironing top surface of base coat.

Fig. 20. Ironing surface of base coat with hot iron to insure absolute smoothness.

Fig. 21. Removing temporary longitudinal battens used to gauge proper thickness of base coat.

the ship is launched. In the background base coat has been applied and in the foreground temporary battens are installed. Note permanent building shores under ship on either side of groundways.

In Figure 15 brushing the base coat onto the ways following heating by a torch is illustrated. Figure 16 shows additional base coat being poured on by one man with a bucket and brushed out by another following him. Although practice differs in various shipyards, one method is to build the base coat up to the desired thickness, using the temporary battens as guides, and then leveling it off as shown in Figure 17.

To help the starting of the ship and to facilitate removal of slip coat in case the base coat is to be reclaimed, some yards heat irons, such as illustrated in Figure 18, for use in smoothing the surface of the base coat as shown in Figure 20. Some yards use

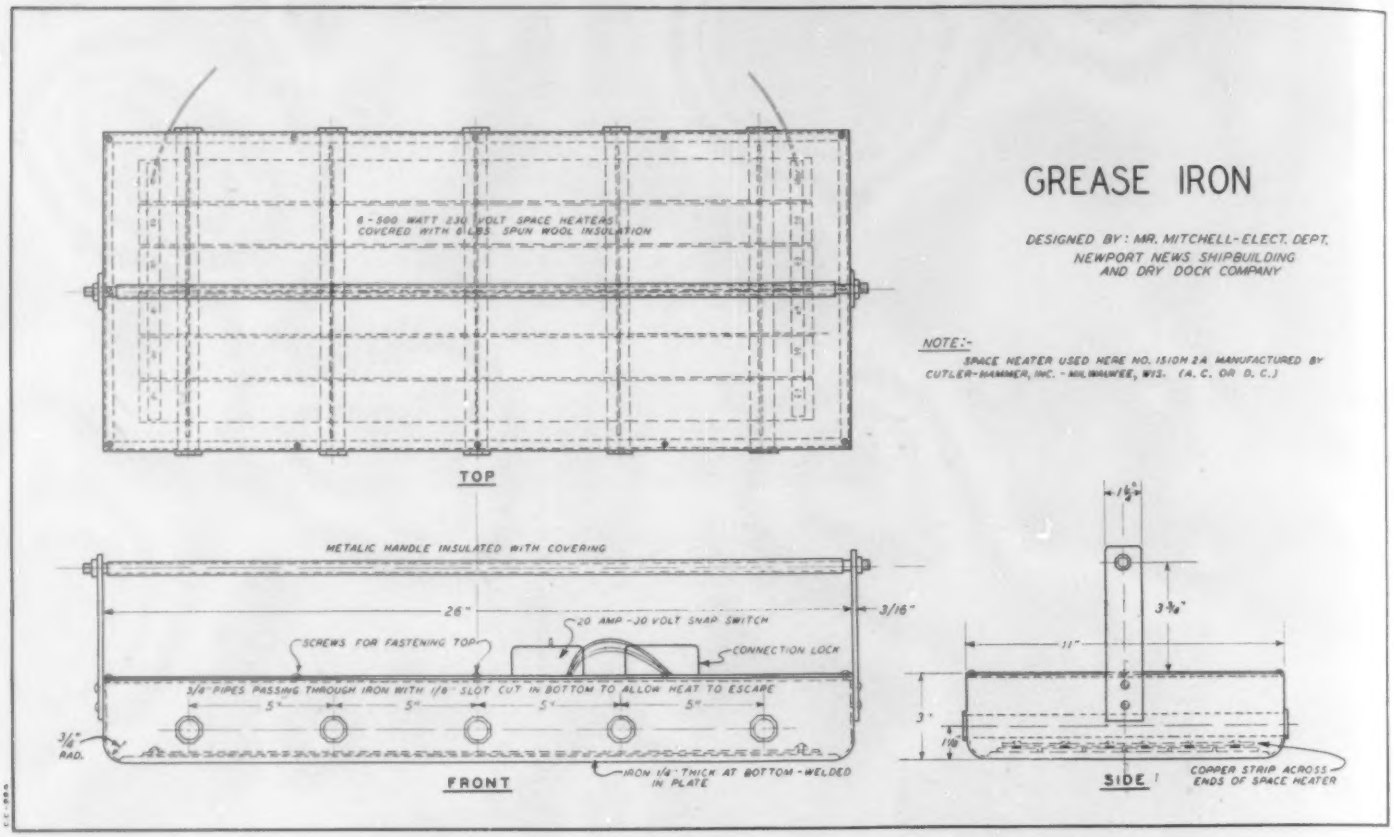

Fig. 19

electric irons, a diagram of which is shown in Figure 19. The advantage of the electric iron is that the proper temperature is always available.

After ironing, the temporary longitudinal battens are removed (Figure 21) as well as those cross ways shown in Figure 22 which are the same size as the grease irons which are inserted to keep the weight of the sliding ways and cradle off the grease until usually the day of or day before the launching, depending upon the size of the ship.

It is now time to apply the slip coat, a water-resistant, specially manufactured grease generally having a No. 2 to No. 4 Grade N.L.G.I. consistency. The purpose of the slip coat is to provide a film between the base coat and the sliding ways having relatively low frictional characteristics. Slip coat is generally applied by hand as illustrated in Figures 23 and 24 to a thickness of $\frac{1}{8}''$ to $\frac{3}{8}''$.

Figure 25 is a posed picture showing the various steps starting with scraping the ways, brushing them, heating with the torch, pouring molten base coat on the ways and brushing it in, and finally applying slip coat. Ironing the base coat was omitted in this operation.

Fig. 22. Removing temporary cross ways batten to be replaced by grease iron.

Fig. 23. Applying slip coat.

Fig. 24. Applying slip coat.

Fig. 25. Posed photo showing various operations starting with scraping the ways, brushing them, heating with the torch, etc., as explained in text.

Sliding Ways are Prepared and Positioned

The sliding ways are now prepared and in some cases the underside may be scraped as shown in Figure 26. Many yards, particularly if the sliding ways are to be put in position a considerable time before the launching, put a brush coat or two of base coat on the underside of the sliding ways, shown in Figure 27 in an inverted position. The base coat on the underside of the sliding ways prevents oil being removed from the slip coat into the wood by capillary attraction. Thus it prevents hardening of the slip coat with consequent increase in frictional characteristics.

The sliding ways are put into position by various methods depending upon the yard and the size of the ways. One method, for large ways, is illustrated in Figure 28, which is a view from the head of the ways showing temporary steel rails in place and extending up beyond the end of the ways. A section of sliding ways is started down on the rails (Figure 29) and, as shown in Figure 30, temporary rollers are installed on the sliding ways to permit them to travel down the rails and on top of the ribband.

The ways are now in place (Figure 31), with grease iron and thumb toggle installed. The latter are spacer blocks which maintain a uniform distance between the sliding ways and the ribbands. Without them, irregular lateral movement of the sliding ways, which are narrower than the groundways, might take place during installation of the packing. But fortunately (or we would not have this picture) this section of the sliding ways has had to be raised to allow repairs to be made. Figure 32 shows the groundways, base coat, slip coat, grease iron in place, and the sliding way raised slightly.

Now the ways are greased, including the outboard ways over which temporary wood covers have been installed to prevent damage to the grease (Figure 33). The cradle which will support the ship on the ways

Fig. 26. Scraping underside of sliding ways.

Fig. 27. Applying coat of base coat to underside of sliding ways.

Fig. 28. View from head of ways showing end of groundways and temporary railroad rails rigged ahead of end of groundways preparatory to installation of sliding ways.

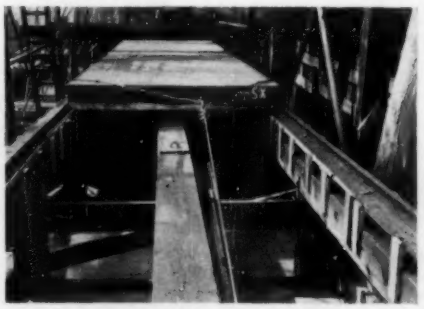

Fig. 29. Section of sliding ways moving down toward final position.

Fig. 30. Detail showing temporary roller on sliding ways riding along top of ribband. Note end of groundways and temporary railroad rails extension beyond ribband.

Fig. 31. Close-up view showing head of spreader shores, foundation of groundways, groundways, grease iron, thumb toggle (19), dirt strips between ribband and sliding ways, and sliding ways (SX).

Fig. 32. This is an unusual photograph. At the bottom are the groundways with base coat and slip coat applied, and grease iron shown in place.

Fig. 33. Outboard end of groundways. The ways have been greased and temporary wood covers installed to prevent damage to the grease.

Fig. 34. On the day before a launching a diver steps down under and has a very careful look around.

during launching has been built around the hull, and everything is in readiness for the pre-launching operations. One of the first steps is to send a diver down to inspect the underwater section of the ways (Figure 34) to make sure no damage has occurred to them.

The grease irons, each of which is numbered, are removed and stacked on a rack (Figure 35) so a ready check can be made to determine if all have been removed. With

Fig. 35. Grease iron rack. Grease irons and thumb toggles are each numbered and when removed are hung in racks where a careful check may be made that all have been removed.

removal of the grease irons, the sliding ways rest directly on the launching greases which now support the weight of the ways and that of the cradle. Likewise the thumb toggles are removed and stacked. The next step is to "wedge up," or drive in the wooden wedges between the sliding ways and the longitudinal timber above the wedges, known as the wedge rider. This operation, which is usually done in several "rallies," tightens the cradle around the ship. One method of wedging-up is shown in Figure 36 where a man is driving the wedges by sledge-hammer blows. There may be over

Fig. 36. "Wedging up." The wedges are driven between the upper surface of the sliding ways and the timbers of the packing between the sliding ways and the hollow of the ship itself.

2,000 wedges on a very large ship, each of which may be given three rallies of four blows each. The use of a ram for this purpose is illustrated in Figure 37.

Fig. 37—Ram being used to drive wedges.

(To Be Continued)

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